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Quarterly Report

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Prepared for: United States Department of Transportation
Pipeline and Hazardous Materials Safety Administration
Office of Pipeline Safety

Project Title: “Consolidated Research and Development Program to Assess the Structural Significance of Pipeline Corrosion”

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For quarterly period ending: December 31, 2007

Technical Status

1. Small Scale (Miniature Flat Tensile) Tests

The small scale miniature test results were reported in the April to June 2007 quarterly report. At that stage it was reported that the results from the micro flat tensile specimens only provide the **relative change** in material properties through the pipe wall. Additional calibration of the results from micro flat tensile specimens would be required using standard round bar tests and that this additional calibration would be undertaken by the external test house, GKSS. These tests have now been completed using standard round bar specimens using grade X100 material from three different pipe manufacturers, designated here as Manufacturer A, B and C. Specimens were machined using material extracted midway through the plate thickness, both in the longitudinal (L) and transverse (T) directions and at the 3 o'clock and 6 o'clock positions. A total of 24 specimens were produced (2 for each location and orientation) and tensile tests undertaken at room temperature. Stress versus strain curves were generated for each location and orientation identified above.

2. FE Analysis to Predict Failure of Higher Strength Corroded Pipelines

Because of the delay in receiving the tensile test results on X100 grade material from the external test house (GKSS), the FE study to predict failure of grade X100 pipelines has been delayed. In the absence of the grade X100 data, work in this quarter has progressed with completing the FE simulations on Grade X80 pipe (48" diameter x 0.78" wall thickness ($D/t=61.6$)), (Task 17). Non-linear models with external defects (patch, axial groove, circumferential groove and pit) have been generated for higher strength pipelines. A series of non-linear FE analyses were conducted. Axial groove, circumferential groove, patch and pit defects were modeled for defect depths of 20%, 50% and 80% of the pipe wall.

3. Review of the Remaining Strength of Corroded Pipelines and Assessment of Deep Defects in Higher Strength Pipelines

A draft of Advantica report number 6781 Issue 3.0 was submitted to PHMSA for review in December 2007. This report has been updated to take into account review comments from PRCI and PHMSA and to describe the results of additional work commissioned by PHMSA.

Plans for Future Activity

Complete Task 17 (Failure loci under combined pressure/bending/axial loading derived for X100) and formally report the results in a technical report.

Begin writing the Phase 2 Final Report (Task 18).